Invitation for Comments on Prospective Candidates for the SAB's Metals Assessment Panel

The EPA Science Advisory Board (SAB, Board) announced in 67 FR 38957-38959, June 6, 2002 that it had been asked to undertake a review of EPA's draft Action Plan for the ``Framework for Metals Assessment and Cross-Agency Guidance for Assessing Metals-Related Hazard and Risk.'' The background, charge, and description of the review documents appear in the above referenced Federal Register notice and are also available at the SAB website (www.epa.gov/sab).

The Board invited nominations for the panel being formed. The SAB's process for panel formation -- approved by the Executive Committee May 8, 2002 -- has been designed for three purposes:

a. to help the Board meet EPA's legal requirements;
b. to be transparent to the public, so the public can understand and participate in the process; and
c. to help the Board fulfill its mission.

Individuals and organizations provided nominees in response to the Federal Register notice; the Agency, SAB members and SAB staff provided additional names and the SAB also reached out to about thirty individuals and organizations for their suggestions. Almost a hundred nominees were considered.

This list has been narrowed down to a “Short List” of 26 candidates based on availability, expertise, interest, and the timely provision of information for the biosketches provided below. We invite comments from the public on these candidates. We welcome information, analysis or documentation that the Board should consider in evaluating the remaining candidates. This information will be carefully considered in selecting the panel.

Normally the SAB Director, in consultation with SAB leadership, as appropriate, makes the final decision about who will serve on the panel. Because the current SAB Director was involved with the development of the document under review, the Acting Deputy Director will make those decisions instead. During Panel Selection, the SAB Staff completes its review of information regarding conflict of interest, possible appearance of impartiality, and appropriate balance and breadth needed to address the charge. The staff reviews all the information provided by the candidates, along with any information that the public may provide in response to the posting of information about the prospective panel on the SAB website during the “Short List Phase,” and information gathered by the SAB Staff independently on the background of each candidate.

Please provide any advice, observations or comments you think would be helpful in selecting the final candidates no later than July 17, 2002. Please send your comments to the attention of Kathleen White, Designated Federal Officer, Metals Assessment Panel. Emailed comments are preferred (white.kathleen@epa.gov).

Written comments will also be accepted. Ms. White's mailing address is: U.S. EPA Science Advisory Board (1400A), 1200 Pennsylvania Avenue, NW, Washington, DC 20460.

The dates for the meetings (face-to-face and teleconference) on this topic will be formally announced in the Federal Register. These meetings include three two-hour conference calls in August for organization, briefings, invited presentations, some public comment, and discussion by the panel. The panel will meet face-to-face on September 10-12, 2002 in or near Washington, DC, with a contingency conference call to wrap up edits is planned for the first week of October. The exact dates and times of the conference calls are still under discussion.

Brief Bios of Candidates for the Metals Assessment Panel (the "Short List")

Dr. Herbert E. Allen is a Professor of Environmental Engineering at the University of Delaware. Before joining the faculty of the University of Delaware in 1989 he was the Director of the Environmental Studies Institute and Professor of Chemistry at Drexel University and preceding that he was on the faculty of the Department of Environmental Engineering at the Illinois Institute of Technology. Dr. Allen received his Ph.D. and B.S. from the University of Michigan and his M.S. from Wayne State University.

Dr. Allen's research has been primarily concerned with fate and effects of trace metals in aquatic and soil environments. He has authored more than 120 journal papers and book chapters, has edited 7 books and has prepared numerous reports and proceedings papers. He has been the Principal or Co-Principal Investigator for over 60 research projects funded by government and by industry. His principal areas of research are on fate of metals in aquatic and terrestrial environments and on the development of site specific criteria. He headed a multi-university consortium of universities, supported by EPA from 1994 until 2000 which conducted research on fate and effects of metals and organic in natural water systems and heads the newly formed multi-university EPA Center for the Study of Metals in the Environment. Dr. Allen was a member of the organizing committee for the 1993 EPA Annapolis workshop and of the 1996 SETAC Pellston conference to review Water Quality Criteria for metals. He served as the Chairman of the Organizing Committee for the Workshop on Metal Speciation that was held in Jekyll Island, Georgia every two years from 1987 through 1995. He has served as a consultant to a number of industrial companies, to government agencies, and to the World Health Organization.

Dr. Peter Chapman received his M.Sc. in Biological Oceanography and his Ph.D. in Benthic Ecology. He is presently employed as a Senior Environmental Scientist with EVS Environment Consultants in North Vancouver, B.C. -- he has worked there since obtaining his Ph.D. from the University of Victoria (BC, Canada) in 1979.

His fields of primary expertise are aquatic ecology, ecotoxicology, and

environmental risk assessment. His clients includegovernments, industry, and NGOs.

He has published over 140 refereed journal and book publications and over 200 technical reports on subjects including: taxonomy, toxicology, aquatic ecology, development of monitoring programs, risk assessment, and biological effects of chemicals (with particular emphasis on metals and metalloids). He fore-fronted development of the Sediment Quality Triad approach for determining pollution-induced degradation in aquatic ecosystems.

He co-Chairs the Inorganics Working Group currently providing advice to Environment Canada on the categorization of metals and other inorganics on Canada's Domestic Substances List (DSL). He is Senior Editor of the journal, Human and Ecological Risk Assessment and edits the Learned Discourses in the SETAC Globe. He has previously served on the US EPA SAB (Sediment Criteria and Global Climate Change Subcommittees). In 1996 he received a plaque from US EPA, Region 10, in recognition of his efforts, working for an NGO, in resolving environmental issues in Port Valdez, Alaska. In 2001 the Society of Environmental Toxicology and Chemistry (SETAC) awarded him its Founders Award, for an outstanding career and contributions to the environmental sciences.

Dr. Max Costa is Professor and Chairman of the Department of Environmental Medicine, Director of the Nelson Institute of Environmental Medicine, Deputy Director NYU Cancer Institute, Professor of Pharmacology, Department of Pharmacology at New York University School of Medicine. Dr. Costa has been working in the area of molecular mechanisms of nickel and chromium carcinogenesis. In the late 1980s, Dr. Costa discovered that nickel compounds could silence genes by increasing DNA methylation and proposed an epigenetic mechanism of nickel carcinogenesis involving hypermethylation of genes and their silencing. Dr. Costa continues to investigate the molecular mechanisms by which nickel compounds produce gene silencing by inhibiting histone acetylation and inducing DNA methylation.

Dr. Costa has received numerous awards including the Young Environmental Scientist Award from NIEHS; the Kenneth Morgareidge Award from the International Life Sciences Institute; Burroughs Wellcome Visiting Professor in the Basic Sciences and Distinguished Scientist Speaker, NIH. He has served on the study sections and panels, such as Toxicology Study Section (1991-1995); Ad Hoc NIH Chemical Pathology Study Section (1997); ALT Toxicology I Study Section (1997); US EPA Scientific Peer Review Panel (1984-1992); University of California Tobacco-Related Disease Study Section (1991-1997).

Dr. Costa has been Session Chairman and invited speaker to over 100 symposia and conferences and an invited lecturer to over 60 universities. He has currently published 240 articles in peer-reviewed journals and books. He has served on many Editorial Boards including Editor, Environmental Carcinogenesis, Chemosphere (1981-1983); Editor, Biology of Metals (1988-1990); Associate Editor, Cell Biology and Toxicology (1987-present); Editorial Board, Biological Trace Element Research

(1988-present); Editor-in-Chief, Molecular Toxicology (1989-1991); Editorial Board, BioMetals 1992-present); Editor, Journal of Pharmacology and Experimental Therapeutics (1992-1994); Editorial Advisory Board, Toxicology and Applied Pharmacology (1996-present); Board of Associate Editors, Environmental Health Perspectives (1996-present); Editorial Board, NIEHS Environmental Health Perspectives (1997-present).

He has served on national and international committees including the IUPAC Subcommittee on Environmental Services and Occupational Toxicology of Nickel (1979-present); American Association for Cancer Research Program Committee (1989); IARC International Working Group on Metals and Their Compounds, Lyon, France (1989); Member of the Board of Directors for Cancergrams and Oncology Overviews (1987-1989); Reviewer for the Agency for Toxic Substances and Disease Registry "Toxicology Profiles" (1985-present); Member of the ICOH Scientific Committee on the Toxicology of Metals (1988-present); Member of the Organizing Committee for the International Association of Environmental Analytical Chemistry (1990- present); Vice President-Elect, Vice President, President, Past President; Society of Toxicology-Metals Specialty Section (1993-1996); Member of the Organizing Committee for the 6th International Symposium on Metal Ions in Biology and Medicine, San Juan, Puerto Rico (2000). He organized the First (1988), Second (1993), and Third (2001) International Meeting on Molecular Mechanisms of Metal Toxicity and Carcinogenicity.

Dr. Costa obtained his Ph.D. in 1976 from the University of Arizona Medical School, Tucson, AZ, and his B.S. in 1974 from Georgetown University, Washington, DC.

Currently, Dr. Costa has several grants from NIH/ NIEHS. Within the last ten years, he has also had funding from NIH/NCI and the U.S. EPA.

Dr. Dominic M. Di Toro is the Donald J. O'Connor Professor of Environmental Engineering at Manhattan College, Riverdale NY, and a Principal Consultant at HydroQual, Inc. Mahwah, NJ. His work at Manhattan College is currently funded by the National Institute for Environmental Health Sciences (NIEHS). About 60 % of HydroQual projects support municipal and other government agencies; the remainder are mostly industrial clients. Dr. Di Toro's metals related work at HydroQual is being supported by the metal trade associations in cooperation with EPA.

Dr. Di Toro has specialized in the development and application of mathematical and statistical analyses to stream, lake, estuarine and coastal water quality and sediment problems. Recently his work has focused on the development of metals and toxic organic chemical water and sediment quality criteria for the EPA, sediment flux models for nutrients and metals and integrated hydrodynamic, sediment transport and water quality models. He has published over one hundred technical papers, as well as the book Sediment Flux Modeling, published by J. Wiley & Sons (2001).

He has participated as an Expert Consultant, Principal Investigator and Project Manager on numerous water quality studies for industry, research foundations and governmental agencies. He has appeared before the EPA Science Advisory Board, together with EPA and other academic scientists on three occasions to present the Equilibrium Partitioning methodology for developing sediment criteria for metals and organics, and most recently to present the Biotic Ligand Model for the development of water quality criteria for metals.

His recent committee service includes on an U.S. Army Corps of Engineers review panel for New York Harbor, an Electric Power Research Institute panel on mercury, the Advisory Committee for the Canadian Network of Toxicology Centers Metals in the Environment Research Program, and as member of the expert workshop on the review of persistent bioaccumulative and toxic chemicals sponsored by the USEPA and the International Council of Metals in the Environmental.

Recent awards include the Society of Toxicology and Environmental Chemistry Founders Award, the society's highest award (1997), the New York Water Environment Association Kenneth Allen Memorial Award (1994), the Department of the Army Certificate of Achievement (1991). He was elected to be Chairman of the 2002 Gordon Conference "Environmental Sciences: Water"

Recent papers dealing with water column and sediment criteria include "Acid Volatile Sulfide Predicts the Acute Toxicity of Cadmium and Nickel in Sediments." Environ. Sci. Technol. 26(1) (1991); "Technical Basis for Establishing Sediment Quality Criteria for Non-ionic Organic Chemicals Using Equilibrium Partitioning." Environ. Toxicol. Chem. 11(12) (1991). "Technical Basis for Narcotic Chemicals and PAH Criteria. I. Water and Tissue, II. Sediments." Environ. Toxicol. Chem. 19, (2000), "A biotic ligand model of the acute toxicity of metals. I. Technical Basis." Environ. Toxicol. Chem. 20 (2001).

Dr. Di Toro has a B.E.E. in Electrical Engineering from Manhattan College, an M.A. in Electrical Engineering from Princeton University, and a Ph.D. in Civil and Geological Engineering from Princeton University.

Dr. Ivan J. Fernandez has served as a faculty member at the University of Maine for the past 19 years. His current title is Professor of Soil Science and Cooperating Professor of Forest Resources. For most of the past decade he has served as Chair of the Department of Plant, Soil and Environmental Sciences. His undergraduate degree is in Biology from Hartwick College (Oneonta, NY), his MS is in Plant and Soil Sciences and his PhD is in Forest Resources from the University of Maine. Following graduate school he worked for the National Council of the Paper Industry for Air and Stream Improvement, Inc. before returning to the University of Maine in 1983.

His area of interest is in biogeochemical cycling in forested ecosystems focusing particularly on soil processes. The major focal points of his research program have had

to do with the effects of atmospheric deposition, climate change, nitrogen loading, and residuals applications primarily in forested environments. A focus of his research has been on long-term experimental watersheds in the northeastern US. His work in metals has been largely related to the effects of long term acid deposition on metal mobilization, atmospheric deposition and accumulation of metals with the most recent efforts focusing on mercury concerns, and the potential accumulation of metals from land applications of effluent, sludge and ash as part of residual management programs.

Funding for his program has come from the US Environmental Protection Agency, USDA Forest Service, National Science Foundation, USDA CSREES and private industry. Most of the support from the private sector has been from the forest products industry. He is currently a member of the Ecological Processes and Effects Committee of the Scientific Advisory Board of US EPA.

Dr. Bruce A. Fowler Ph.D., Fellow A.T.S. received a B.S. degree in Fisheries (Marine Biology) from the University of Washington in 1968 and a Ph.D. in Pathology from the University of Oregon Medical School in 1972. He was a staff scientist at the National Institute of Environmental Health Sciences from 1972 until 1987 when he became Director of the University of Maryland System -wide Program in Toxicology and Professor of Pathology at the University of Maryland School of Medicine. In 2001, he became Professor and Director of the Laboratory of Cellular and Molecular Toxicology in the Department of Epidemiology at the University of Maryland School of Medicine. In August 2002, he will go on an IPA assignment as a Senior Research Advisor to the Agency for Toxic Substances and Diseases Registry (ATSDR) in the Division of Toxicology.

Dr. Fowler, who is an internationally recognized expert on the toxicology of metals has served on a number of State, National and International Committees in his areas of expertise. These include the Maryland Governor's Council on Toxic Substances (Chair), National Academy of Sciences / National Research Council Committees on Toxicology, Toxicology Information Committee, Committee on Women in Science and Engineering, Measuring Lead in Critical Populations (Chair), Biological Markers of Urinary Toxicology, Committee on the Evaluation of Augmenting Potable Water Supplies with Reclaimed Water, and the Subcommittee on Arsenic in Drinking Water of the Committee on Toxicology. He has also served as a temporary advisor to the World Health Organization (WHO) and the International Agency for Research Against Cancer (IARC). Dr Fowler has been honored as a Fellow of the Japanese Society for the Promotion of Science (1990), a Fulbright Scholar and Swedish Medical Research Council Visiting Professor at the Karolinska Insititute , Stockholm , Sweden (1994 -1995) and elected as a Fellow of the Academy of Toxicological Sciences (2000). He currently serves as Chairman of the Scientific Committee on the Toxicology of Metals under the International Commission on Occupational Health (ICOH), as a consultant to the USEPA Science Advisory Board and a member of the Fulbright Scholarship review committee for Scandinavia (1999-, Chair, 2000-2001). He is a member of the AAAS Recruitment and Screening Committee for the Court Appointed

Scientific Experts (CASE) Demonstration Project 2000-.

Dr. Fowler is the author of over 195 research papers and book chapters dealing with molecular mechanisms of metal toxicity and biomarkers for early detection of metal-induced cell injury. He has been the editor or co-editor of 4 books or monographs on metal toxicology and mechanisms of chemical – induced cell injury. His current research is focused on the toxicology of chemical mixtures involving metals, particularly in relation to semiconductors, lead, cadmium, arsenic mixtures and the role(s) of lead – binding proteins in mediating the toxicity of this ubiquitous metal to the kidney and brain. He serves on the editorial boards of a number of scientific journals in toxicology and environmental health. Dr. Fowler has peer-reviewed research funding from the EPA STAR Grant Program and the National Institutes of Health.

Dr. Andrew J. Friedland is Professor and Chair of the Environmental Studies Program at Dartmouth College. His research has focused on understanding the effects of atmospheric deposition of pollutants on elemental cycling processes in high-elevation forests of New England and the Northeastern United States. He has examined the processes and behavior of trace elements such as lead, copper, zinc, nickel and cadmium and major elements such as nitrogen and calcium on vegetation, soils and water. In a number of related projects, he has described the decline of red spruce in the mountains of New England and has examined water relations in conifers during winter. Friedland has published approximately 40 peer-reviewed articles on these topics. He has written one book, co-authored with biologist Carol Folt, Writing Successful Science Proposals (Yale University Press, 2000). Dr. Friedland has received funding from the National Science Foundation, the US Forest Service, the Environmental Protection Agency and private foundations.

Dr. Friedland has taught introductory and advanced environmental science courses as well as soil science, forest biogeochemistry and an interdisciplinary course on science and literature. He was a member of the Citizens Advisory Panel of the Strategy for Vermont's Third Century, an environmental risk assessment program conducted by the State of Vermont and the U.S. EPA. From 1995-1998, he chaired the College Board Advanced Placement Environmental Science development committee. This committee designed the first Advanced Placement course in environmental science that was offered nationwide for the first time in 1998. Approximately 25,000 students took the most recent AP Environmental Science exam earlier in 2002. Dr. Friedland is a member of the Soil Science Society of America, the Ecological Society of America and the American Association for the Advancement of Science. He is currently on the editorial boards of the *Journal of Sustainable Forestry* and *Science of the Total Environment*. Friedland has B.A.s in Biology and Environmental Studies (double major) (1981) and a Ph.D. in Geology (1985), all from the University of Pennsylvania.

Dr. John R. Froines, Ph.D. is Professor, Department of Environmental Health Sciences, UCLA School of Public Health; Director, UCLA Center for Occupational and Environmental Health; and Director, Southern California Particle Center and Supersite

Education:
University of California at Berkeley, B.S., Chemistry, 1963
Yale University, M.S., Physical-Organic Chemistry, 1964
Yale University, Ph.D., Physical-Organic Chemistry, 1967

Principal scientific research and policy interests: 1) chemical toxicology and toxic chemical exposure assessment; 2) health effects of air pollution; 3) identification and characterization of risk factors associated with exposure to toxic chemical agents in the environment and workplace; 4) biomarkers and toxicokinetics in the study of chemical carcinogenesis; 5) risk assessment and pollution prevention, policy and priority setting in environmental and occupational health.

Service:
Chairman, Scientific Review Panel, Air Resources Board (Present)
Member, National Toxicology Program Board of Scientific Counselors (Present to June 2003)
Member, South Coast Air Quality Management District, Clean Fuels Advisory Group (Present)
Member, South Coast Air Quality Management District, MATES II Technical Advisory Committee (Present)
Member, South Coast Air Quality Management District, Advanced Air Pollution Research Plan Steering Committee (Present)
Member, Scientific Advisory Board, Center for Vulnerable Populations Research (Present)
Member, Carcinogen Identification Committee (1995 to 2001)
Member, Presidents (UC) Committee on Environment, Health and Safety of the Three National Laboratories managed by UC (to 1998)
Federal Advisory Committee to DOE: Beryllium Standard (1997-1998)
Chair, Advisory Panel for the Office of Technology Assessment project "Gauging Control Technology and Regulatory Impacts in Occupational Safety and Health" (1992-1995)
National Academy of Sciences Committee on Environmental Epidemiology. Principal author of chapters on exposure assessment in two NAS reports on environmental epidemiology and epidemiology of hazardous waste sites.

Recent sources of grant support: 1) U.S. Environmental Protection Agency; 2) State of California Air Resources Board; 3) National Institute of Environmental Health Sciences; 4) National Institutes of Health, Fogarty International Center; 5) UC Los Alamos National Scientific Laboratory; 6) UC TSRTP (Toxic Substances Research and Teaching

Dr. Joshua W. Hamilton is an Associate Professor of Pharmacology & Toxicology at Dartmouth Medical School and an Adjunct Associate Professor of Chemistry at Dartmouth College. He has been at Dartmouth since 1985. Dr. Hamilton is also the Director of Dartmouth's Center for Environmental Health Sciences and the Director of their Toxic Metals Research Program Project which is a component of the NIEHS

Superfund Basic Research Program. He also directs Dartmouth's Molecular Biology and Proteomics Core Facility.

Dr. Hamilton received a Ph.D. in Toxicology and a M.S. in Genetics from Cornell University, and a B.S. in Biology from Bridgewater College.

Dr. Hamilton has expertise in molecular toxicology and molecular pharmacology, focusing in particular on the effects of toxic metals and other toxic agents in the environment on gene expression. He also has expertise in genetic toxicology, chemical carcinogenesis, and metal toxicology. Dr. Hamilton's research in metals has focused primarily on chromium and arsenic, although he also has expertise is nickel, cadmium and mercury toxicology. His laboratory recently reported that arsenic can act as a potent endocrine disruptor at very low doses relevant to U.S. drinking water exposures. They also recently discovered that the essential element form of chromium, chromium(III), can signal cells through a second, insulin receptor-independent mechanism involving cyclic AMP. His lab also examines the pharmacology of small molecules that can be used to alter gene and protein expression. In this vein his laboratory also recently discovered a new class of molecules that may be beneficial as drugs in treating cystic fibrosis. Dr. Hamilton has published extensively in the scientific literature on these and other research results from his laboratory.

Dr. Hamilton is a member of the Society of Toxicology, the American Association for Cancer Research, the American Chemical Society, and the American Association for the Advancement of Science. He has served as an Associate Editor on several journals including *Toxicology and Applied Pharmacology* and *Chemico-Biological Interactions*. Dr. Hamilton has served on the Society of Toxicology's Program Committee in the area of metals toxicology. He also served as Chair of Dartmouth's Radiation Safety and Environmental Health and Safety Committees. He was a member of New Hampshire's Healthy People 2010 Committee evaluating the role of environmental agents in human health, and is a member of the State of New Hampshire's Biomonitoring Council as well as the City of Manchester NH's Environmental and Public Health Leadership Council. Dr. Hamilton was an external reviewer for the National Research Council's recent report, *Arsenic in Drinking Water, 2001 Update*. He is also a founding member of the New Hampshire Arsenic Consortium, composed of scientists from Dartmouth, the State of New Hampshire, the U.S. Geological Survey and the U.S. EPA working together on arsenic as a public health problem in the northeast. He has also served on numerous federal grant review committees associated with research in these areas.

Dr. Hamilton is currently the Principal Investigator and Director of Dartmouth's Superfund Basic Research Program Project grant on toxic metals from NIEHS, and also is a Principal Investigator or co-Investigator on other individual research grants from NIEHS, the Cystic Fibrosis Foundation, and the National Science Foundation

Dr. Kim Hayes is Professor and Program Director of the Environmental and Water Resources Engineering Program in the Department of Civil and Environmental

Engineering at the University of Michigan.

Professor Hayes' research focuses on the effects of interfacial properties on transport and transformation processes of environmental contaminants, with more than 20 years of experience in conducting experiments on the sorption of heavy metal ions and radionuclides to soil and sediment mineral constituents. His recent research activities include surface spectroscopic investigations of metal ion sorption reactions; impact of trace metal sorption processes on organic pollutant transformation rates; reductive dechlorination by reduced mineral surfaces in anaerobic environments, investigation of nanostructured particles for remediation of metal contaminated groundwaters, sequestration of metals in the subsurface through precipitation and sorption processes; and the study of binders and barriers materials for nuclear waste containment. Support for this work has been provided by the Environmental Protection Agency, the National Science Foundation, Department of Energy, and National Institute for Environmental Health Sciences.

Professor Hayes is presently serving as a reviewer of a National Research Council report on the “Bioavailability of Contaminants in Soils and Sediments.” He recently served as a member of a peer-review panel for the Strategic Environmental Research and Development Program (SERDP) to evaluate proposals on “In-Situ merits of Sequestration Enhancement and Engineered Bioavailability Reduction of Metals in Soils.” He has also participated on a variety other workshop and review panels for the Environmental Protection Agency, National Science Foundation, and Department of Energy related to metal ion speciation, sequestration and mobility. Professor Hayes is currently a member of the Board of Director’s and an Executive Officer of the Association of Environmental Engineering and Science Professors as well as a member of the Technical Advisory Board of the Great Lakes Protection Fund for the state of Michigan.

Professor has more than 100 publications in peer-reviewed manuscripts, book chapters, technical reports, and proceedings detailing work on environmental chemistry and interfacial processes for contaminant remediation. Professor Hayes was awarded a National Science Foundation Presidential Young Investigator Award earlier in his career (1989-1994). His research group has been selected 4 times for American Chemical Society Environmental Chemistry paper awards (1992, 1996, 1997, 1999).
Professor Hayes obtained his BS degree in Chemistry (1980), MSE in Environmental Engineering (1980), MSE Chemical Engineering (1982), a Ph.D. in Environmental Engineering (1987), all from Stanford University.

Dr. Janet Hering is an Associate Professor of Environmental Science and Engineering at the California Institute of Technology, where she has been a member of the faculty for five years. Prior to that, she was an Assistant and later Associate Professor of Civil and Environmental Engineering at University of California, Los Angeles.

She has published 30 papers in refereed scientific journals and is the co-author

of the book *Principles and Applications of Aquatic Chemistry*. She is a past recipient of the National Science Foundation's Young Investigator Award and Presidential Faculty Fellows Award and is a member of the editorial advisory board for the journal *Environmental Science & Technology*. Prof. Hering's research interests include the biogeochemical cycling of trace elements in natural waters and water treatment technologies for the removal of inorganic contaminants from potable water. Her research includes both laboratory and field experimental studies and has been funded by the National Science Foundation, the U.S. Environmental Protection Agency, the American Water Works Association Research Foundation, California Sea Grant, the Petroleum Research Foundation, the University of California Water Resources Center, the Chevron Research and Technology Company, and the Metropolitan Water District of Southern California.

Dr. Hering received her Ph.D. in Oceanography from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program, A.M. in Chemistry from Harvard University, and her A.B. in Chemistry from Cornell University.

Dr. Robert J.M. Hudson has been actively involved in environmental research, education, and service since earning his Bachelor of Science degrees in Chemistry and Chemical Engineering from the University of California at Santa Barbara in 1979. In his first position as at Tetra Tech, Inc., he was responsible for developing the biogeochemistry module of the ILWAS Acid Rain Model under the direction of Steve Gherini. Next, he undertook doctoral studies in Civil and Environmental Engineering at the Massachusetts Institute of Technology. His dissertation research with Professor Francois Morel involved investigating the influence of metal coordination kinetics on iron uptake by phytoplankton. This lead directly to his present research interest in the bioavailability of trace metals. His postdoctoral research included work at the University of California at Santa Cruz with Professor Ken Bruland and at Tetra Tech with Steve Gherini. He was responsible for developing mechanistic simulation models for the transport, transformation, and bioaccumulation of mercury in lakes and for the global cycles of mercury and carbon.

Dr. Hudson is now an Assistant Professor in the Department of Natural Resources and Environmental Sciences at the University of Illinois at Urbana-Champaign. At the University of Illinois, his interest in metals has lead him to conduct modeling studies on methylmercury bioaccumulation and mercury bioavailability, to develop novel analytical methods for measuring methylmercury in natural water samples, and to develop new approaches to modeling field measurements of copper speciation. In addition to his work on trace metals, he is now researching the biogeochemistry of nutrients and agrochemicals in rural watersheds. Most of this work involves developing and applying computer simulation models, although some experimental and empirical modeling studies are also under way.

Dr. Hudson currently has research funding from the USDA, the Illinois Council on Food and Agricultural Research, the USGS, and the Illinois-Indiana Sea Grant College

program.

Dr. Leonard Levin is Program Manager for Air Toxics Health and Risk Assessment at EPRI in Palo Alto, California. He is responsible for supervising and managing research programs on trace metals and their source inventories, atmospheric and aquatic dynamics, global circulation, transport and dispersion, human exposure, human health effects, and risk assessment and management. Dr. Levin specializes in environmental effects and exposure to trace metals and other trace substances in natural and human communities. He is currently lead scientist in basic studies of mercury environmental cycling, involving laboratory, field, and analysis studies of mercury atmospheric and aquatic cycling. He specializes in numerical modeling of environmental transport and dispersion, data assessments of human exposure and risk, and environmental fluid dynamics.

Dr. Levin has served as an advisor to the U.S. Department of State in its preparation of the U.S. national response to the United Nations Environment Programme mercury assessment, and is working with State in preparation for international discussions in Geneva, Switzerland in late 2002 on mercury issues internationally. He served as an advisor to the U.S. Department of Energy's Office of Environmental Management as part of a team investigating verification of environmental models for simulating dispersion and fate of radionuclides from radwaste site management. In addition, Dr. Levin was a peer reviewer for the U.S. Environmental Protection Agency's "Mercury Study Report to Congress" (1997-98), as well as the EPA's Mercury Research Strategy (2000).

Dr. Levin has served as curriculum advisor to the University of California at Berkeley for course work on environmental fate and transport, human health risk assessment, and human exposure indicators.. He is former president of the Northern California chapter, Society for Risk Analysis, and has served as a reviewer for journal articles in *Analytical and Bioanalytical Chemistry*, *Risk Analysis*, and others. He has a B.S. in Earth and Planetary Sciences from the Massachusetts Institute of Technology, an M.S. in Atmospheric Sciences from the University of Washington, and a Ph.D. in Meteorology from University of Maryland. Dr. Levin's research support has come from both base funding at EPRI, a research consortium of member institutions, and from dedicated contracts and grants from such institutions as the U.S. Department of Energy, the State of Wisconsin, the Tennessee Valley Authority, and others.

Dr. Samuel N. Luoma

Current positions:
Senior Research Hydrologist, US Geological Survey, Menlo Park, CA
Lead Scientist, CALFED Bay-Delta Program, Sacramento, CA

Educational background

1964 – 68 Bachelor of Science, Montana State University, Bozeman, MT
1968-70 Master of Science in Zoology, Montana State University, Bozeman, MT.
PhD Marine Biology, Dept. of Zoology, University of Hawaii, Honolulu, HI.

Area of expertise and research activities.
Specific research interests include the bioavailability, fate and effects of metals in aquatic environments, and better merging science and environmental management. Publications include experimental studies and field assessments; and address processes, from geochemical, biological and ecological perspectives. Recent experiments differentiate dietary exposure to metals from dissolved exposures (quantitatively demonstrating the importance ofo dietary exposure); demonstrate the efficiency of selenium transfer through food webs connected to bivalves compared to a food web connected to zooplankton; and show how metal bioavailability from diet is affected by differences in food type. Studies of the form and fate of metals in sediments include the first historical reconstructions from cores in San Francisco Bay. Long-term, intensive field studies are also used to understand processes, trends and effects of metals/metalloids, often using bioindicators, in estuaries, tidal freshwater ecosystems, lakes (primarily in the San Francisco Bay-Delta and its watershed) and rivers (primarily the Clark Fork River in Montana, USA) . A recent study demonstrated return of reproductive capabilities in resident bivalves from an estuarine mudflat, as copper and silver concentrations declined over a 25 year period. Biological, bioindicator, ecological and geochemical data that were collected near monthly for the 25 years, led to the conclusion that declines in the metals were the only explanatory variable with a trajectory similar to the change in reproductive capability.

Examples of Service on other relevant advisory committees.
1985-88, Canadian Natl Research Council Committee on Biologically Available Metals in Sediments.
1986-88, Ad Hoc, 4 person committee that designed USGS National Water QualityAssessment
1991-93, National Science & Engineering Research Council, Canada, Strategic Grant Selection Panel for Environmental Quality. 1993 - Chairman.
1992-94, Chairman, SETAC AdHoc Committee to define New Scientific Initiatives in Toxicology and Chemistry.
1992, 1995, 1999, USEPA Science Advisory Board Subcommittees on Sediment Quality Criteria
1994- 1998, Chair, Science Advisory Committee, USGS/Senior Staff, WRD, USGS
1994- 01, Science Advisory Committee, Center for Environmental Health Research, UC Davis
1996, 1998, SETAC Pellston Workshops on Re-evaluation of the State of the Science for Water Quality Criteria Development
2000-02, National Research Council WSTB subcommittee on Bioavailability of chemicals from soils and sediments.

Sources of recent grant and/or contract support
USGS, CALFED Bay-Delta Program, City of Palo Alto, USEPA/Montana Superfund

Program (monitoring in Clark Fork River)

Dr. Michael C. Newman is a Full Professor at the College of William and Mary's Virginia Institute of Marine Science. From 1999 to 2002, he served as the Dean of Graduate Studies for the School of Marine Sciences. Before joining the faculty at the Virginia Institute of Marine Science, he was a Senior Research Scientist at the University of Georgia's Savannah River Ecology Laboratory and Head of its Environmental Toxicology, Remediation, and Risk Assessment (ETRRA) Group. Dr. Newman earned a B.A. in Biology and an MS in Zoology at the University of Connecticut,. He was awarded an M.S. and a Ph.D. in Environmental Sciences from Rutgers University.

In addition to serving on the Science Advisory Board's Ecological Processes and Effects Committee, Dr. Newman has participated on other committees, including the EPA Food Quality Protection Act (FQPA) Scientific Review Board, Science Advisory Panel reviews of Nontarget Plant, Ecological Effects Test Guidelines and Aquatic Effects Assessment, and the SETAC Pellston Conference Steering Committee, Uncertainty Analysis in Ecological Risk Assessment.

He was an EPA evaluator for document, *Sediment Quality of the New York/New Jersey Harbor System - Trend Assessment*, a member of US DOE (Hanford Site) Risk Assessment, Science and Technology Needs Working Group, and a member of an OECD Working Group charged with revising standard statistical methods for analyzing ecotoxicity data. He was one of two invited US members of the six-member Steering Group to draft recommendations for improving OECD guidelines.

His research interests include toxicity and bioaccumulation models for metals and radionuclides, QSAR-like models for predicting metal bioactivities, toxicant effects on populations, factors modifying toxicity and bioaccumulation, quantitative methods for ecological risk assessment, statistical toxicology, and inorganic water chemistry. He has published approximately 100 scientific articles on these topics. He authored the books, *Quantitative Methods in Aquatic Ecotoxicology* (1995*), Fundamentals of Ecotoxicology, 1st Ed*. (1998) and *Population Ecotoxicology* (2001), and edited *Metal Ecotoxicology: Concepts and Applications* (1991, with A.W. McIntosh), *Ecotoxicology: A Hierarchical Treatment* (1996, with C.H. Jagoe), *Risk Assessment: Logic and Measurement* (1998, with C.L. Strojan*), Coastal and Estuarine Risk Assessment* (2002, with M. Roberts and R. Hale), and *Risk Assessment with Time to Event Models* (2002, with M. Crane, P. Chapman and J. Fenlon).

Current and recent research and related funding sources include: a NASA Space Consortium Grant, a Bell Atlantic Distance Learning Grant, funding from NSF Research Experience for Undergraduates, a US DOE Contract, Science and Technology Needs for DOE Hanford Site Ecological Risk Assessment Activities, UK Direct Toxicity Assessment (DTA) Demonstration Programme: Phase II - Implementation of the Esk Project Plan and an EPA STAR Grant. In addition, EPA,

UGA Research Foundation, National Society of Environmental Toxicology and Chemistry, International Society of Environmental Toxicology and Chemistry, Society of Environmental Toxicology and Chemistry - Europe (UK), University of Georgia's Interdisciplinary toxicology program, the University of London - Royal Holloway, and John Wiley & Sons have awarded funds for foreign travel to Dr. Newman.

Dr. Jerome O. Nriagu

Current Position: Professor & Director, Environmental Health Program, Department of Environmental Health Sciences, School of Public Health and Research Scientist, Center for Human Growth & Development, University of Michigan

Educational Background:
D.Sc. (meritorious), University of Ibadan,
Ph.D., University of Toronto
M.S., University of Wisconsin (Madison)
B.Sc. (Honors), University of Ibadan

Area of Expertise: Environmental Chemistry (specifically the sources, behavior, fate and effects of toxic metals in various environmental media); environmental health (especially exposure assessment, evaluation and management of environmental risk factors pertaining to metal poisoning, disease prevalence studies); environmental justice.

Research Activities: Disproportionate exposure to environmental toxins in minority communities; lead poisoning in developing countries; lead in the oral environment of disadvantaged children in Detroit, Michigan; bladder cancer and arsenic in drinking water of Michigan; dermal exposure and genotoxic effects of arsenic on skin cells; human influence on global cycling of metals; mercury emission from chlor-alkali plants; photochemistry of mercury (especially in Lake Huron watershed); bioregulation of metal levels in the Great Lakes.

Service on other advisory committees, professional societies, especially those associated with issues under discussion in this review
Science Advisory Board, US Environmental Protection Agency, Total Exposure Committee, 1995-2001
Board of Directors, Alliance to End Childhood Lead Poisoning, Washington, D.C., 1999-2002
Board of Directors, Ecology Center, Ann Arbor, MI, 2000-2003
Council of Public Health Consultants, NSF International, Ann Arbor, MI, 1997-present

Sources of recent grant and/or contract support

US EPA
National Cancer Institute
NIEHS
Michigan Sea Grant Program
Great Lakes Protection Fund

Dr. Mary Kay O'Rourke is an Associate Professor of Public Health Research and Medicine at the University of Arizona in the Environmental and Community Health Division. She has conducted interdisciplinary environmental research relating environmental exposure to human health for over 22 years. O'Rourke holds degrees in geology (B.A. Alfred University) and geosciences (M.S. Ph.D. The University of Arizona) with minors in the biosciences.

Her current research addresses exposures *to Coccidioides immitis*, arsenic and other metals and pesticides. She has directed several exposure assessment surveys investigating metal, pesticide, VOC and PAH exposures. She directed two surveys examining pesticide exposure among children in Yuma Co. Arizona and a pesticide exposure in the Gila River Indian Community. She was Co-Principal Investigator of the National Human Exposure Assessment Survey and the Arizona Border Survey. These studies utilize multimedia and multipathway approaches to exposure assessment. She has extensive experience in designing and implementing exposure assessment field surveys, quality assurance programs and the data processing protocols for large studies. Prior to joining the College of Public Health, she evaluated human symptom response to bioaerosols (pollen, fungi, house dust mites) using the tools of exposure assessment in a cross-sectional population of the Pima County (AZ) work force. Projects have been funded by the Environmental Protection Agency, National Cancer Institute, Centers for Disease Control, the Arizona Disease Control Research Commission, and Arizona Department of Health Services.

Dr. O'Rourke has served on several panels and workshops for NIEHS and EPA; these include: "Technical Workshop on Issues Associated with Considering Developmental Changes in Behavior and anatomy when assessing Exposure to Children," Example Exposure Scenarios," "Lessons Learned from the National Human Exposure Assessment Survey," and " Fat Intake Analysis." Dr. O'Rourke was a Councilor for the International Society of Exposure Analysis and a past Secretary-Treasurer of the Pan-American Aerobiology Association (1989-1993). O'Rourke served as the Secretary General of the International Association for Aerobiology (IAA) from 1990-1994 and as an IAA councilor from 1994-98. She is a past member of the review boards of Grana and Aerobiologia.

Dr. Charles A. Pittinger is an environmental toxicologist with broad experience in risk assessment and risk management and technical policy development. He is currently Principal Scientist with the Cadmus Group, Inc., a multi-disciplinary

consulting firm specializing in ecological risk assessment, air and water issues, energy efficiency and global climate processes. He previously served as Director of Research for SoBran, Inc., managing a division of some 50 people supporting federal environmental research contracts with USEPA ORD Laboratories, including contracts with NERL and NHEERL. The majority of Dr. Pittinger's professional career was spent with Procter & Gamble, where he served as Section Head and Principal Scientist for their corporate Human & Environmental Safety Division for 17 years.

Dr. Pittinger has conducted and managed R&D programs involving extensive field monitoring, assessment and laboratory studies for private companies and trade associations, has led peer reviews, conducted regulatory policy development and negotiations for industry and government. His regulatory experience in the U.S. and abroad extends to consumer product ingredients and industrial chemical registrations; site contamination and remediation; natural resource management; and effluent permitting.

Dr. Pittinger has diverse experience in a range of technical areas including: ecological risk assessment; hazard and risk management; risk communications; pollution prevention; life-cycle analysis; ecological indicators of sustainability; persistent, bioaccumulative and toxic substances; and high production volume chemicals.

Dr Pittinger's work has required close coordination among internal business sectors and external regulatory (e.g., USEPA OPPTS, ORD and the Science Advisory Board (SAB), Organization for Economic Cooperation and Development), trade (e.g., American Industrial Health Council, American Chemistry Council, Soap & Detergent Association, Alliance for Chemical Awareness), non-profit (e.g., The John F. Heinz III Center, International Life Sciences Institute), academic and professional scientific organizations (e.g., Society for Environmental Toxicology and Chemistry, Society for Risk Analysis). He is currently a member of the SAB's Ecological Processes and Effects Committee.

Dr. Pittinger earned his doctorate in zoology (environmental toxicology) from Virginia Polytechnic Institute and State University. He received a Master's Degree in Ecology from The University of Tennessee, and a Bachelor's Degree in Biology from the University of Notre Dame.

Dr. William Stubblefield is a senior environmental toxicologist with Parametrix, Inc. in Fort Collins, Colorado; he also serves as affiliate faculty in the Departments of Environmental Health and Fish and Wildlife Biology at Colorado State University. Dr. Stubblefield has more than 15 years of experience in environmental toxicology, site impact assessment, water quality criteria derivation, and aquatic and wildlife toxicology studies. He has authored more than 50 peer-reviewed publications and technical presentations in the areas of aquatic and wildlife toxicology and

environmental risk assessment. He has conducted a variety of research programs aimed at the evaluation of the toxicity of metals in the environment and issues associated with the discharge of mine-associated waters and tailings. Dr. Stubblefield's research has examined acclimation induced changes in the responses of aquatic organisms to copper, zinc, and cadmium; evaluated the acute and chronic toxicity of manganese; and quantified the effects of water quality characteristics, e.g., hardness, alkalinity, dissolved organic carbon, on the toxicity of boron, cobalt, nickel, and silver. His most recent research uses a combination of laboratory and field methods to investigate the effects of storm water-associated short-term pulse exposures of metals to aquatic organisms and examines the fate and disposition of storm water-associated metals in natural systems.

Dr. Stubblefield is an active member of the *Society of Environmental Toxicology and Chemistry*, where he serves as a member of the Society's Board of Directors, chairman of the Publications Advisory Council, associate editor of the Society's newsletter, chairman of the SETAC's Metals Advisory Group, past member of the Editorial Board for *Environmental Toxicology and Chemistry*, and 2002 annual meeting co-chair. He has been an invited participant at a number of scientific and regulatory conferences, served on U.S. EPA peer-review panels, and frequently acts as a technical reviewer for a number of scientific publications.

Dr. Stubblefield has a Ph.D. in Environmental Toxicology from the University of Wyoming, a M.S. degree in Toxicology/Toxicodynamics from the University of Kentucky, and a B.S. in Biology from Eastern Kentucky University.

Dr. Valerie M. Thomas

Current Position: Research Scientist, Princeton Environmental Institute, Princeton University

Educational Background:
Ph.D., Theoretical Physics, Cornell University
B. A. (High Honors), Swarthmore College

Area of Expertise: Sources, emissions and fate of pollutants, including lead, cadmium, mercury, and dioxin. Industrial ecology. End-of-life management of products. Use of quantitative methods for environmental policy.

Research Activities: Current research projects include: Phase-out of leaded gasoline in Africa. The content of lead, cadmium, and mercury in electronic products. Electronic and optical tags for product end-of-life management. Economics of second-hand markets. Sources of dioxin. Development of research agendas for industrial ecology.

Service on other advisory committees, professional societies, especially those

associated with issues under discussion in this review
Member, U.S. EPA Science Advisory Board (SAB), Environmental Engineering Committee, appointed October 2000. Co-chair, Subcommittee on Industrial Ecology.
Consultant, U.S. EPA Science Advisory Board, 1995-2000.

2000: Review of *EPA Dioxin Reassessment.*
Review of *Residual Risk Case Study* (for Clean Air Act residual risk assessments)
1996-99:*Integrated Risk Project*. Human Exposure and Health, and Steering Committee.
1997: Review of *EPA's Report to Congress on Mercury.* Chair, sources working group.
1995: Review of *EPA Dioxin Reassessment*: Exposure Panel.

Consultant on use and sources of cadmium, New York Academy of Sciences, New York-New Jersey Harbor Industrial Ecology Project. 2002.

US Director, Russian Lead Project. Participants from a range of Russian NGO, scientific, industry, and governmental organizations, and with participants from the Johns Hopkins School of Hygiene and Public Health, and the International Lead Management Center. 1997-2000.

New Jersey Comparative Risk Project, NJ Department of Environmental Protection (DEP):
Ecosystem Technical Working Group, and Project Team. 1999-2001.

Consultant to Environmental Defense, on vehicle emissions, 2000.

Co-Organizer (with R. Socolow and C. Andrews). NSF-sponsored Workshop on Industrial Ecology and Policy, White House Conference Center, April 1998.

Technical Expert to US Delegation, OECD Workshop on Lead Products, Toronto, Sept. 1994.

Sources of recent grant and/or contract support
AT&T Foundation
US Environmental Protection Agency
National Science Foundation
New York Academy of Sciences
New Jersey Department of Environmental Protection
US Agency for International Development (pending)

Dr.Nga Tran is a Senior Managing Scientist at Exponent's Food & Chemicals practice, and is based in Washington, DC. Dr. Tran has more than 15 years of experience in environmental and occupational health risk assessment and

management in the private and public sectors and academia. Dr. Tran has worked on a wide range of issues, including health surveillance strategy at the Department of Defense (DOD) cleanup sites, chemical and radiation risk harmonization at the Department of Energy's (DOE) cleanup sites, methodology for assessing and prioritizing environmental health threats to military personnel deployed overseas, environmental insurance risks, probabilistic exposure/risk assessment, dietary exposure assessment, product stewardship, industrial hygiene and epidemiology. Prior to joining Exponent Dr. Tran was a faculty member at the Johns Hopkins University, Bloomberg School of Public Health where she conducted research and taught exposure and risk assessment, risk prioritization, and risk harmonization. Dr. Tran remains an Adjunct Assistant Professor at the university.

Dr. Tran had served as a Special Assistant to the Assistant Secretary for Environment, Safety and Health at DOE where she was an active participant in the inter-agency efforts to coordinate risk assessment, cost-benefit analysis and regulatory reform issues. She advised the Assistant Secretary on risk policy decisions as they relate to cleanup efforts at DOE sites. Dr. Tran is also a Certified Industrial Hygienist with experience in developing and implementing cost-effective health and safety and product stewardship programs. As a Corporate Public Affairs Manager, she had successfully implemented risk communication programs, counseled and trained facility managers on effective community relations, implemented an industry community outreach initiative (the Chemical Manufacturing Association-Community Awareness/Emergency Response, (CMA-CAER), consulted facility managers on media relations, advised corporate officers on public policy matters, and worked with the Company's lobbyists to develop legislative position/strategy on issues critical to the business operations.

Dr. Tran has served on a number peer review panels sponsored by the EPA, including "Comparative Dietary Risks: Balancing the Risks and Benefits of Fish Consumption" (2000), "National Human Exposure Analysis Survey (NHEXAS) Data Analysis Strategy" (1999), "Water Quality Criteria Methodology: Human Health – Federal Register Notice" and "Ambient Water Quality Criteria Derivation Methodology Human Health – Technical Support Document" (1999). Dr. Tran is a member of the American Industrial Hygiene Association, Risk Assessment Committee (1996-) and the Technical Advisory Committee for the development of EPA's Aggregate and Cumulative Exposure and Risk Assessment Model (Lifeline™ Project) (1999-).

Dr. Tran was a Kellogg Fellow in the Doctor of Public Health program at the Johns Hopkins University, Bloomberg School of Public Health. Her dissertation was on U.S. food safety policy and pesticide risks.

Credentials and Professional Honors

Dr.P.H., Johns Hopkins University, Bloomberg School of Public Health, 1995
M.B.A., DePaul University, 1991
M.P.H., Yale University, Department of Epidemiology and Public Health, 1985
B.A., Biology, Whitman College, 1982

Sources of recent grant and/or contract support
National Academy of Sciences/National Research Council (2002)
3M (2002)
FMC (2002)
AIG Environmental (2001-2002)
U.S. Department of Defense (2000-01; 1996-98)
U.S. Department of Agriculture (1999-2000)
U.S. EPA and The Environment Law Institute (1997-2000)
The Pew Charitable Trusts (1999-2001)

Dr. Joyce Tsuji is a Principal Scientist with Exponent, a multi-disciplinary sciences and engineering firm. She is a board-certified toxicologist with 14 years of experience in toxicology, risk assessment, and risk communication on projects in the United States, Canada, South America, Australia, and Asia for industry, EPA, the U.S. Department of Justice, the Australian EPA, and state and local municipalities.

Particular areas of interest include exposure assessment, biomonitoring, and the toxicology and bioavailability of metals. She has designed dietary exposure studies of metals in subsistence populations and developed programs for health education and biomonitoring of populations potentially exposed to metals in the environment. Her recent work has included a statistical analysis of published data to examine the relationship between mercury in air and mercury in urine. This work assists health professionals in predicting mercury vapor exposures based on urinary mercury levels. \

Dr. Tsuji has served on expert committees for the National Academy of Sciences/National Research Council (NAS/NRC), U.S. EPA, U.S. Army, and the State of Washington. Service on expert committees involving metals include NAS/NRC committees on copper in drinking water and spacecraft water exposure levels for chemicals; technical reviewer for the NRC report on arsenic in drinking water; State of Washington work group on protective measures and remedies for widespread arsenic and lead contamination in soil, and expert panel on uptake and accumulation of arsenic forms in fish and shellfish; and expert panel commissioned by the U.S. Army to review a risk assessment of a former army munitions installation.

She received an undergraduate degree in biological sciences from Stanford University and a Ph.D. focused on physiology and ecology from the Department of Zoology, University of Washington.

Dr. Bernard Weiss is Professor of Environmental Medicine and Pediatrics at the University of Rochester School of Medicine and Dentistry, where he has been a member of the faculty since 1965. Before coming to Rochester, he served on the faculty of the Johns Hopkins School of Medicine, and, earlier, held an appointment

at the U.S. Air Force School of Aviation Medicine. He earned a B.A. in psychology at New York University and a Ph.D. from the University of Rochester also in Psychology.

Dr. Weiss has served as a member of many committees and panels devoted to toxicology and environmental health, including those organized by the U.S. Environmental Protection Agency's Science Advisory Board (for example, the Dioxin Reassessment Review Panel and the subcommittee on human testing of pesticides, and earlier served as chair of the Subcommittee on Metals), and the National Academy of Sciences (for example, the recent Committee on Air Quality in Passenger Aircraft). He is especially concerned with risk assessment issues arising from the effects of environmental chemicals on brain development and brain aging. He is the editor or co-editor of seven books and monographs and author or co-author of over 200 articles. His special interests and publications lie primarily in areas that involve chemical influences on behavior; these include the neurobehavioral toxicology of metals such as lead, mercury and manganese; endocrine disruptors such as dioxin; solvents such as toluene and methanol; drugs such as cocaine; and air pollutants such as ozone. Current and recent grant support have been provided by NIH (specifically, the National Institute of Environmental Health Sciences) and ATSDR (Agency for Toxic Substances and Disease Registry).

Dr. John C. Westall is currently Professor of Chemistry and Chairman of the Chemistry Department at Oregon State University. He received his BS in Chemistry from the University of North Carolina at Chapel Hill in 1971. Following a year as a Rotary International Scholar at the Swiss Federal Institute of Technology in Zurich, he earned his PhD in Chemistry from the Massachusetts Institute of Technology in 1977, where his research was focused on analytical and environmental chemistry.

Dr. Westall's current research is focused on the application of surface and solution chemistry to problems in environmental geochemistry, electrochemistry, and analytical chemistry. Current research topics include: (i) interactions of inorganic ions with heterogeneous environmental complexants, such as humic substances and surfaces of soil particles, and development of models for these complex interactions; (ii) electrochemical processes in the environment, including corrosion and redox transformations of inorganic and organic pollutants; (iii) the processes that control the distribution of hydrophobic, ionogenic, and ionic organic compounds between water and environmental sorbents; (iv) electric double layer phenomena associated with environmental surfaces; (v) mathematical methods for the determination of equilibrium constants from experimental data; (vi) the application of multicomponent chemical equilibrium models to complex biogeochemical problems.

Dr. Westall has served frequently on review panels for the U.S.

Environmental Protection Agency, the U. S. Department of Energy, and several industries on issues of environmental chemistry. He served on the National Academy of Sciences / National Research Council Committee on Technologies for Cleanup of Subsurface Contaminants in the DOE Weapons Complex from 1997-1999. He is developer of chemical speciation models MICROQL, MINEQL, STEADYQL and the software FITEQL for the inverse problem, and was principal lecturer in OECD and U.S. EPA workshops on Metal Speciation in 1987 - 1991.

His research has been funded recently by grants from the U.S. Environmental Protection Agency, the National Science Foundation, and the U. S. Department of Energy.

Dr. Herbert Windom is a geochemist at the Skidaway Institute of Oceanography where he has been employed since 1968. He was Acting Director from 1/94 until 3/2001 at which time he became an Emeritus Professor. He is also an Adjunct Professor at the University of Georgia and at Georgia Tech from which most of his graduate students come. Over the past thirty plus years his research has focused the transfer and fate of trace elements in riverine, estuarine and coastal marine environments and the contamination of these systems from land-based sources. And to understand how such things as watershed characteristics, climatology and human intervention affect processes, he has conducted studies in various parts of the world from the Russian Arctic to the Asian tropics and has studied heavily impacted as well as relatively pristine systems. This research has been/is funded by NSF, NOAA, EPA, ONR, DOD and other State and Federal agencies. Past national and international service includes the United Nations sponsored Group of Expert on the Protection of the Marine Environment (Chairman), several environmental committees of the International Council for the Exploration of the Seas and UNESCO and several review committees and panels for National and State environmental programs. Present service includes EPA's Board of Scientific Councilors, the Coastal Advisory Council for the State of Georgia and several additional State, private and professional boards, panels and committees Dr. Windom received his BS from Florida State University and MS and Ph.D degrees from the University of California, San Diego (Scripps Institution of Oceanography)

Dr. Judith T. Zelikoff is a tenured-Associate Professor at New York University School of Medicine in the Department of Environmental Medicine, where she has been on the faculty since 1984. She is also an adjunct professor at Cornell University (Ithaca, NY). Her scientific interests concern the effects of environmental chemicals, in particular metals on the immune response of exposed hosts. Her research in eco-immunotoxicology has demonstrated the effects of metal and organic polluted aquatic sites on the health status of resident fish. Along these lines, she has also employed fish as well as other sentinel species for evaluating chemical pollutant-induced health effects in mammalian systems. In addition to research in ecotoxicology, Dr. Zelikoff's studies in environmental science also include research

in the area of inhalation toxicology, with particular emphasis on the role of metallic, gaseous, and particulate air pollutants on pulmonary host resistance against infectious disease. She has well-funded, active research programs in both of the aforementioned scientific areas. The ecotoxicological studies are supported, for the most part, by the Department of Defense (DOD, U.S. Army), while studies in pulmonary toxicology are supported by a variety of Federal and Private Agencies including the National Institute of Environmental Health Sciences (NIEHS) and National Institute of Occupational Safety and Health (NIOSH).

Dr. Zelikoff has over 70 publications in the areas of ecotoxicology and pulmonary toxicology, as well as edited three books including "*Immunotoxicology of Occupational and Environmental Metals*," *Ecotoxicology: Responses, Biomarkers and Risk Assessment*," and "*Pulmonary Immunotoxicology*". In addition, she is an Associate Editor for the journal *Biomarkers* and *Journal of Toxicology and Environmental Health*, as well as an Editorial Board member for six journals including *Toxicology and Applied Pharmacology, Toxicology, Fish and Shellfish Immunology, and Diseases of Aquatic Organisms*. In addition, she served from 1995-1998 as the North American Editor for *Toxicology and Ecotoxicology News*. Dr. Zelikoff has also organized numerous meetings/workshops/symposia worldwide including one on the "Mechanisms of Metal Toxicity in Aquatic Organisms" and "Health Risks Associated with Prenatal Metal Exposure".

She is an active member of the National Society of Toxicology (SOT) and currently serves as president-elect of the Metals Specialty Section, as well as a member of the Education Committee and Sub-Committee for Minority Initiatives. Over the last 5 years, she has served as president of the SOT Immunotoxicology Specialty Section, Chair of the Continuing Education Committee, and member of the Program Committee. Moreover, she currently serves on the National Research Council Subcommittee for Spacecraft Water Guidelines, and from 1996 -- 2000 served as a member of the NIEHS Special Emphasis Panel. She also serves as an *ad hoc* grant Reviewer for EPA, DOD, NIH, and a variety of state Sea Grant Programs. Dr. Zelikoff has also contributed to the American Lung Association Criteria Document on Woodsmoke and EPA document on endocrine disruptors.

Dr. Zelikoff received her Ph.D. in experimental pathology from the University of Medicine and Dentistry of New Jersey (UMDNJ), a master's degree in microbiology from Fairleigh Dickinson University, and a BS in biology from Upsala College.